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GB 1484167 A

US 4434186 A

US 4421778 A

US 4242367 A

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(54) Process for making milk shakes

(57) Process of making thick milk-shakes as shown below which utilises ice-cream making apparatus but different processing conditions, the milk-shake being frozen in a continuous freezer to a temperature of 0°C to 6°C at the outlet from the freezer and the product having previously been pumped by an aerator pump which introduces about 25% air into the product so that a 400 ml container of product weighs about 300 gm. The product is stabilised so that it retains its volume and does not suffer any significant collapse when heated to ambient temperatures from its normal chilled storage temperature of 0°C to 5°C.

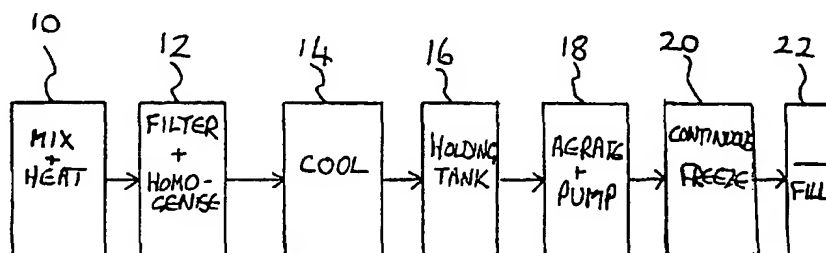


Fig 1

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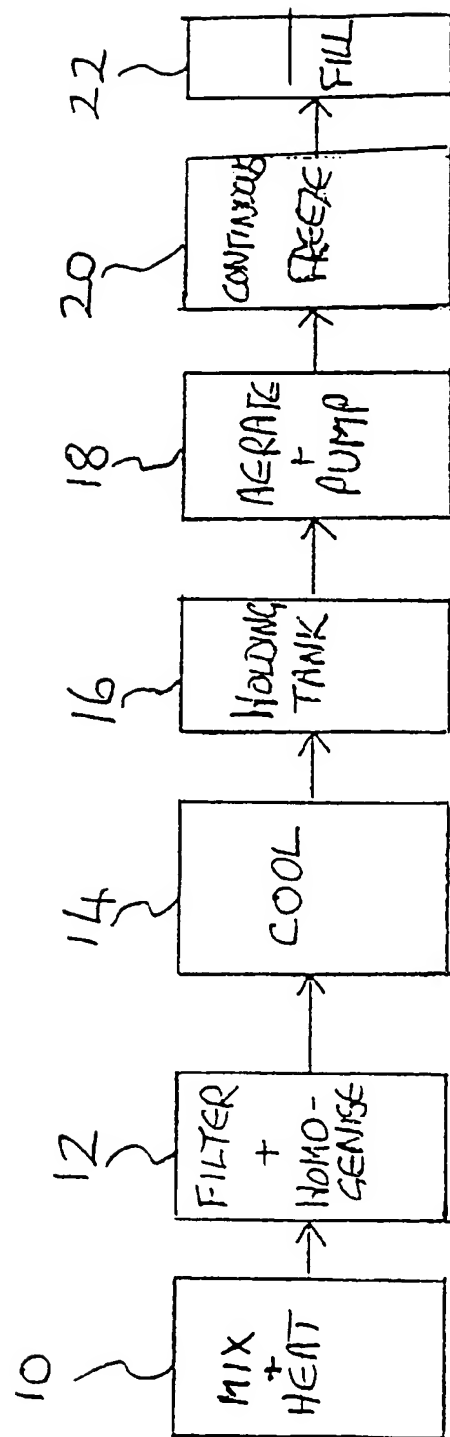


Fig 1

**MILK-SHAKES AND PROCESS FOR MAKING THEM**

This invention is concerned with milk-shakes and a process for making milk-shakes.

5

Milk-shakes include ingredients selected from milk, milk products (for example milk powder which may be skimmed milk powder, and whey butter), water, sugar (for example granulated sugar or dextrose) flavouring, emulsifier and stabiliser.

10

In producing milk-shakes, the selected ingredients are mixed in proportions to provide a product of a desired consistency and flavour, normally being processed at a temperature higher than freezing, including heating to pasteurising temperature.

15

Recently so-called "thick" milk-shakes have become popular but manufacture of those is relatively inefficient and there is, in any event, a tendency for the product to collapse when its temperature rises from the chilled temperature, normally between 0°C and 5°C at which the product is stored and dispensed, to ambient temperatures of, for example, 15°C to 20°C when the product is purchased and being consumed.

20

The applicants have surprisingly found that by using apparatus normally used for the manufacture of ice-cream but with different processing parameters an improved thick milk-shake can be made efficiently.

25

One of the objects of the present invention is to provide an improved process for making a thick milk-shake.

30 Another object of the present invention is to provide an improved thick

milk-shake.

The invention may be considered to provide in one aspect a process for making milk-shake including ingredients selected from milk, milk products, water, sugar, flavouring, emulsifier and stabiliser, comprising:

- (a) mixing the selected ingredients
- (b) heating the mixture to a temperature in excess of 80°C
- (c) homogenising the heated mixture
- (d) cooling the homogenised mixture to a temperature less than  
10 20°C
- (e) pumping the cooled homogenised mixture using an aerator pump through a continuous freezer and freezing the mixture so that it leaves the freezer at a temperature of 0°C and -6°C and
- (f) collecting the product.

15

In a preferred embodiment of the invention described by way of example the ingredients do not include fresh milk but milk products, namely skimmed milk powder and whey butter. However, it is envisaged that the process may be carried out utilising fresh cows or goats milk (in which  
20 case the amount of water included in the mixture will be adjusted as necessary) or indeed milk from other sources and/or milk powder and other milk products from the same sources.

In carrying out step (b) the mixture is preferably heated to a temperature  
25 of 86°C for five minutes and then run through a filter, suitably of 100 microns, before homogenisation.

Suitably, in carrying out step (d) the homogenised mixture is cooled to a temperature of between 13°C and 17°C in a plate cooler (below 13°C  
30 there is a tendency for the mixture to start to set like jelly).

In carrying out a processing in accordance with the invention there is no "ageing" of the product. Normally, in the production of ice-cream, following cooling of the ice-cream mixture in the plate cooler, the ice-cream mixture remains in an ageing tank for a considerable period of time  
5 for example about 24 hours. In contrast, in carrying out a process in accordance with the invention, although the milk-shake mixture passes through the ageing tank, that is used merely as a temporary holding tank and the mixture normally will remain in the tank for no more than 15 minutes (suitably about 10 minutes). If the mixture remains in the tank  
10 for too long a period it has been found that the mixture tends to set, normally reaching a jelly-like consistency within 40 minutes of entering the ageing tank.

The milk-shake mixture is supplied from the holding tank to an aerator  
15 pump during which some air is introduced as the mixture is pumped to a continuous freezer of a type normally used in the manufacture of ice-cream. The flow rate through the aerator pump and through the continuous freezer is controlled such that the mixture leaves the continuous freezer at a temperature at or below freezing point, preferably between  
20 0°C and -6°C more preferably of between 0°C and minus 3°C.

In carrying out step (f) the product is suitably collected in individual containers into each of which a volumetrically measured amount of product is filled. Conveniently, the containers are cardboard having a  
25 lining of polymeric material eg polyethylene.

The amount of air introduced into the mixture is preferably such that 400 ml of the milk shake produced weight between 280 g and 320 g, preferably about 300 g. This is in contrast to the production of ice-cream  
30 where 400 ml of standard ice-cream may include so much air that its

weight is only about 140 g. Even a high quality ice-cream would normally have an air content such that the volume of 400 ml has a weight only about 220 g. Thus it can be seen that in carrying out the process of the present invention the product has a much lower air content than any  
5 ice-cream: this low air content is believed to result from the relatively short period of time during which the mixture is in the aerator pump and the speed with which it passes through the pump and continuous freezer.

In carrying out a preferred process in accordance with the invention, the  
10 ingredients include emulsifier/stabiliser; suitably these will be of a type which is normally used in the production of mousse and which, preferably, includes gelatin. The stabiliser is chosen such that the milk-shake product does not collapse significantly even when it reaches ambient temperature. The amount of emulsifier/stabiliser included must be  
15 selected carefully to produce a product having a desired structure. This is in contrast with previously known thick milk-shakes which tend to collapse and become free-flowing liquid product if they are heated to ambient temperatures.

20 The milk-shake product is normally stored for supply at a temperature between 0°C and 5°C.

In another aspect the invention may be considered to provide a thick milk-shake including ingredients selected from milk, milk products, water,  
25 sugar, flavouring, emulsifier and stabiliser having an air content such that 400 ml of the milk-shake weighs between 280 and 320 gm.

In yet a further aspect the invention may be considered to provide a milk-shake including ingredients selected from milk, milk products, water,  
30 sugar, flavouring, emulsifier and stabiliser wherein the stabiliser includes

gelatin.

The above and other of the various objects and the several features of the present invention will become more clear from the following description to be read with reference to the accompanying drawing of a process for making a thick milk-shake and a milk-shake embodying the invention. It will be realised that this process and milk-shake have been selected for description to illustrate the invention by way of example.

10 In the accompanying drawing:-

Figure 1 is a flow-chart showing the various steps in carrying out the illustrative process.

The various ingredients which go to make up the illustrative milk-shake are first procured in the correct proportions, suitably by weighing the ingredients and they are then mixed together in a mixing and heating apparatus 10; in carrying out the mixing process it may be necessary to heat the mixture at certain stages to some extent and continuous agitation of the mixture is desirable throughout at the mixing stage.

20

Once the ingredients have been mixed thoroughly they are heated to a temperature of 86°C for a period of five minutes in the apparatus 10. The heated product is then run through a 100 micron filter and homogenised in a homogeniser 12 operating at a high pressure, suitably between 1000 and 2000 psi.

25

From the homogeniser 12 the product passes through a plate cooler 14 in which it is cooled to a temperature of between 13°C and 17°C and from there passes into a holding tank 16 in which it remains for a short period, less than 15 minutes in normal circumstances.

30

From the holding tank 16 (which is similar to the ageing tank used in ice-cream production), the mixture passes to an aerator pump 18 which is conveniently a centrifugal pump of a type commonly used in the production of ice-cream.

5

The mixture is pumped by the pump 18 through a continuous freeze freezer, for example a Cattabriga twin cylinder continuous freezer of the type used in ice-cream production, to freeze the mixture.

- 10 In carrying out the illustrative process the pump and freezer are operated so that the mixture leaving the freezer is at a temperature between 0°C and -3°C.

The frozen mixture passes from the freezer 20 through a filling apparatus 22 which volumetrically fills a succession of containers with a volumetrically controlled amount of the frozen milk-shake, for example a volume of 400 ml, weighing about 300g ie about 25% air in the product. The containers used are conveniently cardboard with a lining of polymeric material, namely polyethylene. After each container has been filled it is sealed by application of a metal foil lid in known manner and this is finally protected by application of a plastic lid. A date code will normally be stamped onto the container and a drinking straw may be attached to the outside of the container. Subsequently, the containers are boxed with a number of containers in one box and the boxes labelled. The product boxes are stored under refrigeration at a temperature of between 0°C and 5°C and remain at this temperature until they are despatched by refrigerated vehicle (also refrigerated to a temperature of between 0°C and 5°C) to the final selling point.

- 30 The production line described above is basically similar to an ice-cream

production line but, as discussed, the operating parameters of the illustrative process are considerably different from those used when producing ice-cream and results in a very different product.

- 5 An example of the ingredients used and the mixing steps which arise in producing one product in accordance with the invention are set out hereinafter as Example I.

### Example I

10

The following ingredients are measured as follows:-

		Wt. percent
	semi-instant skimmed milk powder 35 kg	8.41
	SE31 6 kg	1.47
15	SE99 2 kg	0.49
	water 307 lt	70.83
	whey butter 16 kg	3.91
	granulated sugar 25 kg )	
	dextrose 8 kg )	12.78
20	flavourings, colours and other additives as desired.	2.18
		-----
		100.00

- SE31 is an emulsifier/stabiliser system supplied under the trade name
- 25 "Cremodan Mousse 31" which is a product usually used in stabilising mousse and which is believed to include gelatin, Mono- and diglycerides of fatty acids E471 and glucose as a dispersing agent.

- SE99 is an emulsifier/stabiliser system supplied under the tradename
- 30 "Cremodan SE99 VEG" which is a product usually used in hard ice-cream

and milk-ice and which is believed to include mono- and diglycerides of fatty acids (E471), sodium alginate (E401) Guar gum (E412).

The SE31 may be wholly or partially replaced by a different, vegetarian  
5 emulsifier/stabiliser system - "Cremodan Mousse 40" which also is a product usually used in stabilising mousse and is believed to include amidated pectin (E440) standardised with sugars, lactic acid esters of mono- and diglycerides of fatty acids (E472b), milk protein, carrageenan (E407) standardised with sugars and starch. The amount included will  
10 normally be about the same as for SE31 but, of course, should be selected to provide an end-product having a suitable structure.

"Cremodan" is a Registered Trade Mark in the United Kingdom. The "Cremodan" products are supplied by Danisco Ingredients (UK) Ltd  
15 (Grinstead Division), Northern Way, Bury St Edmunds, Suffolk. IP32 6NP, United Kingdom.

The weight ratio of mousse stabiliser eg SE31 to SE99 has been found to be important in producing the characteristics of the final product and a  
20 weight ratio SE31/SE99 of about 3/1 has been found to be especially satisfactory in producing a creamy product of a desired structure.

The semi-instant skimmed milk powder may be replaced by an equivalent quantity of fresh milk. If so the amount of water must be substantially  
25 reduced to produce a shake of the required properties.

It will be appreciated that although the percentage of flavourings etc may vary depending on the flavours to be produced, the relative proportions of the other components will preferably remain substantially constant.

The above ingredients may be used as a basis for various flavourings in the milk-shake and may for example include chocolate flavour products which will include some cocoa powder and may also include chocolate chips, strawberry flavour shake (including strawberry syrup, essence and colour) and banana flavour products which include will include banana essence and colour. It will be appreciated that various other flavourings may be used.

The amount of sugar included may also be adjusted somewhat, depending on the flavouring and other ingredients which are used.

Having obtained the requisite amount of the various ingredients, a mixing and heating vessel 10 and the other parts of the apparatus are first rinsed using hot water. The mixing and heating vessel 10 is then filled with the measured amount of cold water and heated to a temperature of between 20°C and 30°C. The skimmed milk powder, SE31, SE99 and the granulated sugar and dextrose are all added at this stage whilst the mixing vessel is subjected to continuous agitation. The vessel is then heated up to a temperature of between 40°C and 50°C and the whey butter, flavourings, colour etc are added at that stage with the mixture still being continuously agitated. The remainder of the process is as discussed previously.

The product made according to Example 1 is a thick milk-shake which is dispensed at a temperature of between 0°C and 5°C. However, it is found that the milk-shake retains its stability and shows little or no tendency to collapse even when reaching an ambient temperature of 15°C to 20°C.

**CLAIMS**

1. A process for making milk-shake including ingredients selected from milk, milk products, water, sugar, flavouring, emulsifier and  
5 stabiliser, comprising:
  - (a) mixing the selected ingredients
  - (b) heating the mixture to a temperature in excess of 80°C
  - (c) homogenising the heated mixture
  - (d) cooling the homogenised mixture to a temperature less than  
10 20°C
  - (e) pumping the cooled homogenised mixture using an aerator pump through a continuous freezer and freezing the mixture so that it leaves the freezer at a temperature of 0°C and -6°C, preferably 0°C to -3°C
  - 15 (f) collecting the product.
2. A process according to claim 1 wherein a period of no more than 40 minutes elapses between step (c) and freezing of the mixture.
- 20 3. A process according to claim 2 wherein the period is up to fifteen minutes.
4. A process according to any one of the preceding claims wherein the air content of the collected product is such that 400 ml of product weighs  
25 between 280 gm and 320 gm.
5. A process according to claim 4 wherein the air content is such that 400 ml of product weighs about 300 gm.
- 30 6. A process according to any one of the preceding claims wherein in

step (f) the product is filled volumetrically into containers.

7. A process according to claim 6 wherein the containers are cardboard with a liner of polymeric material.

5

8. A process according to any one of the preceding claims wherein the stabiliser is of a type normally used in the production of mousse.

9. A process according to claim 8 wherein the stabiliser includes  
10 gelatin.

10. A process according to either one of claims 8 and 9 wherein the stabiliser comprises a first component selected from a stabiliser including gelatin, mono- and diglycerides of fatty acids and dispersing agent and  
15 stabiliser including amidated pectin standardised with sugar, lactic acid esters of mono- and diglycerides of fatty acids, milk protein, carrageenam standardised with sugars and starch, the first component being in an amount of about three parts by weight and a second component including mono- and diglycerides of fatty acids, sodium alginate and guar gum in an  
20 amount of 1 part by weight.

11. A process according to any one of the preceding claims comprising a further step of storing the product at a temperature of between 0°C and 5°C.

25

12. A process of making a milk-shake substantially as hereinbefore described with reference to Example I.

13. A thick milk-shake including ingredients selected from milk, milk  
30 products, water, sugar, flavouring, emulsifier and stabiliser having an air

content such that 400 ml of the milk-shake weighs between 280 and 320 gm.

14. A milk-shake including ingredients selected from milk, milk  
5 products, water, sugar, flavouring, emulsifier and stabiliser wherein the stabiliser includes gelatin.

15. A milk-shake according to either one of claims 13 and 15 wherein the stabiliser is of a type normally used in stabilising mousse.

10

16. A milk-shake according to any one of claims 13 to 15 made by a process according to any one of claims 1 to 12.



Application No: GB 9708810.8  
Claims searched: 1-12

Examiner: Keith Kennett  
Date of search: 9 July 1997

**Patents Act 1977**  
**Search Report under Section 17**

**Databases searched:**

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:  
UK CI (Ed.O): A2B ( BMD1, BMD2, BMD9, BMD39, BMF9, BMF19 )  
Int CI (Ed.6): A23C 9/154; A23G 9/02, 9/04  
Other:

**Documents considered to be relevant:**

Category	Identity of document and relevant passage	Relevant to claims
X	GB 1484167 ( KRAFTCO ) see whole document	1,6,8
X	US 4434186 ( DESIA ) see column 6 line 51 to column 7 line 19 & column 7 lines 52-59	1,4,6,8,11
X	US 4421778 ( KAHN ) see column 6 lines 11-45	1,6,8
X	US 4242367 ( IGOE ) see Example 1	1,6

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.